PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: Unknown
Filed: Herewith
Inventor(s):
Clois E. Powell

Title: PROCESS FOR TREATING SMECTITE CLAYS TO FACILITATE EXFOLIATION

§

Examiner: Unknown
Group/Art Unit: Unknown
Atty. Dkt. No: 5628-02102/EBM

CERTIFICATE OF EXPRESS MAIL
UNDER 37 C.F.R. §1.10

"Express Mail" mailing label number: EL764354328US
DATE OF DEPOSIT: May 4, 2001

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Commissioner for Patents
Box Patent Application
Washington, DC 20231

Derrick Brown

SUBMISSION OF CLEAN VERSIONS OF AMENDMENTS

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

A clean version of the amendment to the specification made in the Preliminary Amendment for the above referenced case is shown below.

This application is a continuation of U.S. Patent Application Serial No. 09/559,686 which claims priority to U.S. Provisional Patent Application No. 60/131,415.

It is believed that no fees are due in connection with this filing of the clean version of the amended claims. However, if any fees are due, the Assistant Commissioner is hereby authorized to deduct said fees from Conley, Rose & Tayon Deposit Account No. 50-1505/5628-02102/EBM.

Respectfully submitted,

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Date: May 4, 2001

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PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Amendment

Sir:

Please amend the above-captioned application as follows:

In the Specification:

On page 1, before "FIELD OF THE INVENTION", please add the following sentence:

--This application is a continuation of U.S. Patent Application Serial No. 09/559,686 which claims priority to U.S. Provisional Patent Application No. 60/131,415.--

In the Claims:

Please cancel claims 1-9 without prejudice.

Please add the following claims:

10. A method of preparing a nanocomposite comprising:

mixing a smectite clay with negatively charged organic molecules to form a treated smectite clay; and

adding the treated clay to a polymer matrix such that the platelets are exfoliated within the polymer matrix.

11. The method of claim 10, wherein the negatively charged organic molecule comprises a high charge density anionic polymer.

12. The method of claim 10, wherein the negatively charged organic molecule comprises a polyacrylate.

13. The method of claim 10, wherein the negatively charged organic molecule is added to the smectite clay at about 0.1 to about 1.0% by weight of the dry smectite clay.

14. The method of claim 10, wherein the smectite clay comprises montmorillonite.

15. The method of claim 10, wherein the smectite clay comprises hectorite.

16. The method of claim 10, wherein the smectite clay comprises bentonite.

17. The method of claim 10, wherein the smectite clay comprises beidelite.

18. The method of claim 10, wherein the smectite clay comprises saponite.

19. The method of claim 10, wherein the smectite clay comprises stevensite.

20. The method of claim 10, further comprising contacting a quaternary ammonium compound with the smectite clay.

21. The method of claim 10, further comprising contacting the treated smectite clay with a quaternary ammonium compound, wherein the quaternary ammonium compound complexes with both the clay edges and the clay basal surfaces.

22. The method of claim 10, further comprising subjecting the treated smectite clay to a high shear treatment; and
contacting the sheared treated smectite clay with a quaternary ammonium compound.

23. The method of claim 10, wherein subjecting the treated smectite clay to a high shear treatment comprises passing an aqueous slurry of the smectite clay through a Manton-Gaulin mill.

24. The method of claim 10, further comprising contacting the treated smectite clay with a quaternary ammonium compound, wherein the quaternary ammonium compound comprises a branched chain quaternary ammonium compound.

25. The method of claim 10, further comprising contacting the treated smectite clay with a quaternary ammonium compound, wherein the quaternary ammonium compound comprises a tallow, branched chain alkyl quaternary ammonium compound.

26. A nanocomposite prepared by the process comprising:

mixing a smectite clay with negatively charged organic molecules to form a treated smectite clay; and

adding the treated clay to a polymer matrix such that the platelets are exfoliated within the polymer matrix.

27. The nanocomposite of claim 26, wherein the negatively charged organic molecule comprises a high charge density anionic polymer.

28. The nanocomposite of claim 26, wherein the negatively charged organic molecule comprises a polyacrylate.

29. The nanocomposite of claim 26, wherein the negatively charged organic molecule is added to the smectite clay at about 0.1 to about 1.0% by weight of the dry smectite clay.

30. The nanocomposite of claim 26, wherein the smectite clay comprises montmorillonite.

31. The nanocomposite of claim 26, wherein the smectite clay comprises hectorite.

32. The nanocomposite of claim 26, wherein the smectite clay comprises bentonite.

33. The nanocomposite of claim 26, wherein the smectite clay comprises beidelite.

34. The nanocomposite of claim 26, wherein the smectite clay comprises saponite.

35. The nanocomposite of claim 26, wherein the smectite clay comprises stevensite.

36. The nanocomposite of claim 26, further comprising contacting a quaternary ammonium compound with the smectite clay.

37. The nanocomposite of claim 26, further comprising contacting the treated smectite clay with a quaternary ammonium compound, wherein the quaternary ammonium compound complexes with both the clay edges and the clay basal surfaces.

38. The nanocomposite of claim 26, further comprising subjecting the treated smectite clay to a high shear treatment; and
contacting the sheared treated smectite clay slurry with a quaternary ammonium compound.

39. The nanocomposite of claim 26, wherein subjecting the treated smectite clay to a high shear treatment comprises passing the aqueous slurry of the smectite clay through a Manton-Gaulin mill.

40. The nanocomposite of claim 26, further comprising contacting the treated smectite clay with a quaternary ammonium compound, wherein the quaternary ammonium compound comprises a branched chain quaternary ammonium compound.

41. The nanocomposite of claim 26, further comprising contacting the treated smectite clay with a quaternary ammonium compound, wherein the quaternary ammonium compound comprises a tallow, branched chain alkyl quaternary ammonium compound.

42. A composition comprising:

an organoclay exfoliated in a polymer matrix, wherein the organoclay comprises a smectite clay, a negatively charged organic compound and a quaternary ammonium compound.

43. The composition of claim 42, wherein the smectite clay comprises montmorillonite.

44. The composition of claim 42, wherein the smectite clay comprises hectorite.

45. The composition of claim 42, wherein the smectite clay comprises bentonite.

46. The composition of claim 42, wherein the smectite clay comprises beidelite.

47. The composition of claim 42, wherein the smectite clay comprises saponite.

48. The composition of claim 42, wherein the smectite clay comprises stevensite.

49. The composition of claim 42, wherein the negatively charged organic compound comprises a high charge density anionic polymer.

50. The composition of claim 42, wherein the negatively charged organic molecule comprises a polyacrylate.

51. The composition of claim 42, wherein the quaternary ammonium compound comprises a branched chain quaternary ammonium compound.

52. The composition of claim 42, wherein the quaternary ammonium compound comprises a tallow, branched chain alkyl quaternary ammonium compound.

53. The composition of claim 42, wherein the polymer matrix comprises a nylon resin.

54. The composition of claim 42, wherein the polymer matrix comprises polyamide.

55. The composition of claim 42, wherein the polymer matrix comprises epoxy.

56. The composition of claim 42, wherein the polymer matrix comprises polyvinyl.

57. The composition of claim 42, wherein the polymer matrix comprises polyacrylamide.

58. A method of making a clay composition comprising:

contacting a smectite clay with at least one negatively charged organic compound; and,

contacting a smectite clay with a quaternary ammonium compound.

59. The method of claim 58, wherein the smectite clay comprises montmorillonite.

60. The method of claim 58, wherein the smectite clay comprises hectorite.

61. The method of claim 58, wherein the smectite clay comprises bentonite.

62. The method of claim 58, wherein the smectite clay comprises beidelite.

63. The method of claim 58, wherein the smectite clay comprises saponite.

64. The method of claim 58, wherein the smectite clay comprises stevensite.

65. The method of claim 58, wherein the negatively charged organic compound comprises a high charge density anionic polymer.

66. The method of claim 58, wherein the negatively charged organic molecule comprises a polyacrylate.

67. The method of claim 58, wherein the quaternary ammonium compound comprises a branched chain quaternary ammonium compound.

68. The method of claim 58, wherein the quaternary ammonium compound comprises a tallow, branched chain alkyl quaternary ammonium compound.

69. The method of claim 58, further comprising adding the smectite clay to water to form an aqueous slurry of the smectite clay.

70. The method of claim 58, comprising adding the smectite clay to water to make an aqueous slurry of the smectite clay prior to contacting the smectite clay with the negatively charged organic compound, wherein the quaternary ammonium compound complexes with both the clay edges and the clay basal surfaces.

71. The method of claim 58, further comprising adding the smectite clay to water to make an aqueous slurry of the smectite clay; contacting the aqueous slurry of the smectite clay with the negatively charged organic compound and subjecting the aqueous slurry of the smectite clay to a high shear treatment prior to contact with the quaternary ammonium compound.

72. The method of claim 58, wherein subjecting the treated smectite clay to a high shear treatment comprises passing the aqueous slurry of the smectite clay through a Manton-Gaulin mill.

73. A clay composition prepared by the process comprising:

contacting a smectite clay with at least one negatively charged organic compound; and,

contacting a smectite clay with a quaternary ammonium compound.

74. The composition of claim 73, wherein the smectite clay comprises montmorillonite.

75. The composition of claim 73, wherein the smectite clay comprises hectorite.

76. The composition of claim 73, wherein the smectite clay comprises bentonite.

77. The composition of claim 73, wherein the smectite clay comprises beidelite.

78. The composition of claim 73, wherein the smectite clay comprises saponite.

79. The composition of claim 73, wherein the smectite clay comprises stevensite.

80. The composition of claim 73, wherein the negatively charged organic compound comprises a high charge density anionic polymer.

81. The composition of claim 73, wherein the negatively charged organic molecule comprises a polyacrylate.

82. The composition of claim 73, wherein the quaternary ammonium compound comprises a branched chain quaternary ammonium compound.

83. The composition of claim 73, wherein the quaternary ammonium compound comprises a tallow, branched chain quaternary ammonium compound.

84. The composition of claim 73 further comprising adding the smectite clay to water to form an aqueous slurry of the smectite clay.

85. The composition of claim 73, further comprising adding the smectite clay to water to make an aqueous slurry of the smectite clay prior to contacting the smectite clay with the negatively charged organic compound.

86. The composition of claim 73, further comprising adding the smectite clay to water to make an aqueous slurry of the smectite clay; contacting the smectite clay with the negatively charged organic compound and subjecting the aqueous slurry of the smectite clay to a high shear treatment prior to contact with the quaternary ammonium compound.

87. A composition comprising:

a smectite clay;

a negatively charged organic compound; and,

a quaternary ammonium compound.

88. The composition of claim 87, wherein the smectite clay comprises montmorillonite.

89. The composition of claim 87, wherein the smectite clay comprises hectorite.

90. The composition of claim 87, wherein the smectite clay comprises bentonite.

91. The composition of claim 87, wherein the smectite clay comprises beidelite.

92. The composition of claim 87, wherein the smectite clay comprises saponite.

93. The composition of claim 87, wherein the smectite clay comprises stevensite.

94. The composition of claim 87, wherein the negatively charged organic compound comprises a high charge density anionic polymer.

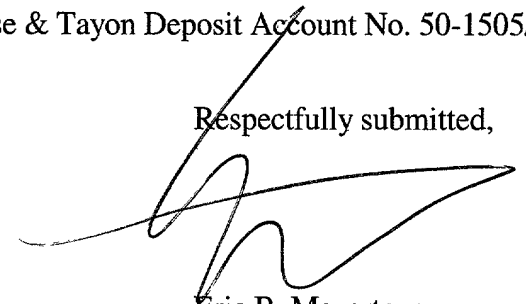
95. The composition of claim 87, wherein the negatively charged organic compound comprises a polyacrylate.

96. The composition of claim 87, wherein the quaternary ammonium compound comprises a branched chain quaternary ammonium compound.

97. The composition of claim 87, wherein the quaternary ammonium compound comprises a tallow, branched chain alkyl quaternary ammonium compound.

It is believed that no fees are due in connection with the filing of this Preliminary Amendment. However, if any fees are due, the Assistant Commissioner is hereby authorized to deduct said fees from Conley, Rose & Tayon Deposit Account No. 50-1505/5628-02102/EBM.

Respectfully submitted,



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